

Energy Levels of Neutral Platinum

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All known energy levels of neutral platinum (Pt I) are presented, including 119 new levels based on analysis of recent comprehensive observations of the spectrum. These results are taken from a detailed analysis of the spectrum to be published in *Journal de Physique II*.

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1. Introduction

An extensive analysis of the energy levels of neutral platinum (Pt I) based on new spectra recorded at the National Institute of Standards and Technology [1], at Kitt Peak National Observatory [2], and at Laboratoire Aimé Cotton has recently been prepared for publication elsewhere [3]. For complete-

ness of the present special issue of the Journal of Research of the National Institute of Standards and Technology we list in Tables 1 and 2 the values of the Pt I energy levels. Full details of the analysis are given in Ref. [3].

¹ In association with Université Paris-Sud.

Table 1. Even energy levels of Pt I. The leading components of the eigenfunctions are derived from theoretical studies of the configuration groups $(5d+6s)^{10}$, $5d^96d$, $5d^97s$, $5d^97d$, and $5d^98s$. Where other configurations are indicated, the designations are empirical

Energy (cm ⁻¹)	<i>J</i>	Leading component	Energy (cm ⁻¹)	<i>J</i>	Leading component
0.	3	$5d^96s\ ^3D$	63922.22	3	
775.892	2	$5d^96s\ ^1D$	64128.722	5,4	
823.678	4	$5d^86s^2\ ^3F$	64141.155	6	$5d^86s6d\ (^3F_4, ^3D)$
6140.180	0	$5d^{10}\ ^1S$	64182.29	2	
6567.461	2	$5d^96s\ ^3D$	64222.379	7	$5d^86s6d\ (^3F_4, ^3D_3)$
10116.729	3	$5d^86s^2\ ^3F$	64267.43	5	$5d^86s6d\ (^3F_4, ^3D)$
10131.887	1	$5d^96s\ ^3D$	64312.78	4	$5d^86s6d\ (^3F_4, ^3D)$
13496.271	2	$5d^96s\ ^1D$	64330.53	6	$5d^86s6d\ (^3F_4)$
15501.845	2	$5d^86s^2\ ^3F$	64379.155	5	$5d^86s6d\ (^3F_4)$
16983.492	0	$5d^86s^2\ ^3P$	64505.839	3	$5d^86s7s\ (^3F_3, ^3S_1)$
18566.558	1	$5d^86s^2\ ^3P$	64668.46	4	$5d^86s6d\ (^3F_4, ^3D)$
21967.111	4	$5d^86s^2\ ^1G$	65132.91	2	$5d^97d\ ^3P$
26638.591	2	$5d^86s^2\ ^1D$	65308.53	4	$5d^97d\ ^3G$
52379.375	3	$5d^97s\ ^3D$	65339.93	5	$5d^97d\ ^3G$
52667.213	2	$5d^97s\ ^1D$	65346.52	3	$5d^97d\ ^3F$
55640.623	5	$5d^86s7s\ (^3F_4, ^3S_1)$	65361.63	1	$5d^97d\ ^1P$
56784.325	4	$5d^86s7s\ (^3F_4, ^3S_1)$	65381.38	4	$5d^97d\ ^3F$
59591.82	1	$5d^96d\ ^3S$	65387.03	3	$5d^97d\ ^3D$
59731.571	2	$5d^96d\ ^3P$	65395.72	2	$5d^97d\ ^1D$
59751.177	4	$5d^96d\ ^3G$	66967.965	5	$5d^86s8s\ (^3F_4, ^3S_1)$
59764.266	3	$5d^96d\ ^3D$	67342.66	4	$5d^86s8s\ (^3F_4, ^3S_1)$
59782.853	1	$5d^96d\ ^1P$	68006.95	3	$5d^96d\ ^3G$
59812.72	5	$5d^96d\ ^3G$	68072.245	3	$5d^96d\ ^3F$
59872.140	3	$5d^96d\ ^1F$	68094.74	2	$5d^96d\ ^3F$
59882.421	4	$5d^96d\ ^3F$	68121.56	4	$5d^96d\ ^3G$
59908.170	2	$5d^96d\ ^1D$	68169.42	2	$5d^96d\ ^1D$
60357.804	1	$5d^97s\ ^3D$	68275.31	2	
60573.69	0	$5d^96d\ ^1S$	68703.45	4	
60640.669	2	$5d^97s\ ^3D$	68716.32	6	$5d^86s6d\ (^3F_4, ^1D_2)$
60790.393	3	$5d^86s7s\ (^3F_4, ^3S_1)$	68759.01	4	
60884.001	4	$5d^86s7s\ (^3F_4, ^1S_0)$	68831.115	5	
62567.995	3	$5d^98s\ ^3D$	68912.21	4	
62705.33	2	$5d^98s\ ^1D$	68947.47	3	

Table 2. Odd energy levels of Pt I. The leading components of the eigenfunctions are derived from theoretical studies of the mixed group of configurations $5d^9 6p + 5d^8 6s 6p + 5d^7 6s^2 6p + 5d^9 7p$. Where other configurations are indicated, the designations are empirical

Energy (cm ⁻¹)	<i>J</i>	Leading component	Energy (cm ⁻¹)	<i>J</i>	Leading component
30156.854	4	$5d^8 6s 6p$ (⁴ F) ⁵ D	54839.206	3	$5d^8 6s 6p$ (⁴ P) ³ D
32620.018	2	$5d^9 6p$ ³ P	55009.37	4	$5d^8 6s 6p$ (² G) ³ H
33680.402	5	$5d^8 6s 6p$ (⁴ F) ⁵ F	55216.828	1	$5d^9 6p$ ³ D
34122.165	3	$5d^9 6p$ ³ F	55536.276	3	$5d^8 6s 6p$ (² P) ³ D
35321.653	3	$5d^8 6s 6p$ (⁴ F) ⁵ D	55984.51	5	$5d^8 6s 6p$ (² G) ³ H
36296.310	4	$5d^8 6s 6p$ (⁴ F) ⁵ G	56288.65	4	$5d^8 6s 6p$ (² G) ³ F
36781.551	6	$5d^8 6s 6p$ (⁴ F) ⁵ G	56670.20	2	$5d^8 6s 6p$ (⁴ P) ³ P
36844.710	1	$5d^9 6p$ ³ P	56794.43	5	$5d^7 6s^2 6p$ ⁴ F ³ G
37342.101	2	$5d^9 6p$ ³ P	57041.73	1	$5d^8 6s 6p$ (⁴ P) ³ P
37590.569	4	$5d^9 6p$ ³ F	57506.187	3	$5d^8 6s 6p$ (² G) ³ F
37769.073	3	$5d^9 6p$ ³ D	57987.392	2	$5d^9 7p$ ³ P
38536.160	5	$5d^8 6s 6p$ (⁴ F) ⁵ F	58101.17	3	$5d^9 7p$ ³ F
38815.908	2	$5d^8 6s 6p$ (² D) ³ F	58326.75	2	$5d^8 6s 6p$ (² P) ³ D
40194.228	4	$5d^8 6s 6p$ (⁴ F) ⁵ F	58388.47	4	$5d^7 6s^2 6p$ ⁴ F ⁵ G
40516.243	2	$5d^8 6s 6p$ (⁴ F) ⁵ D	58482.14	3	$5d^9 7p$ ¹ F
40787.857	2	$5d^8 6s 6p$ (⁴ P) ⁵ P	58780.80	1	$5d^9 7p$ ¹ P
40873.529	0	$5d^8 6s 6p$ (² D) ³ P	59127.72	2	$5d^8 6s 6p$ (² D) ³ F
40970.165	3	$5d^8 6s 6p$ (⁴ F) ⁵ G	59346.33	4	$5d^9 7p$ ³ F
41802.744	1	$5d^8 6s 6p$ (² D) ³ D	59462.28	2	$5d^9 7p$ ¹ D
42660.058	3	$5d^8 6s 6p$ (⁴ F) ⁵ D	59492.41	4	$5d^9 7p$ ³ F
43187.836	1	$5d^8 6s 6p$ (⁴ F) ⁵ D	59686.20	3	$5d^7 6s^2 6p$ ⁴ F ⁵ G
43945.543	3	$5d^8 6s 6p$ (⁴ P) ⁵ P	59792.23	1	$5d^8 6s 6p$ (⁴ P) ³ S
44432.663	4	$5d^8 6s 6p$ (⁴ F) ⁵ G	59916.97	2	$5d^9 7p$ ¹ D
44444.364	2	$5d^8 6s 6p$ (⁴ F) ⁵ F	59920.03	3	$5d^9 7p$ ³ D
44730.313	3	$5d^8 6s 6p$ (² F) ³ D	60328.02	3	$5d^8 6s 6p$ (⁴ F) ³ F
45398.478	1	$5d^8 6s 6p$ (⁴ P) ⁵ P	60423.93	4	$5d^8 6s 6p$ (² G) ³ G
46170.386	2	$5d^9 6p$ ³ F	60441.30	1	$5d^9 7p$ ¹ P
46419.962	2	$5d^8 6s 6p$ (⁴ P) ⁵ D	61097.48	2	$5d^8 6s 6p$ (² G) ³ F
46433.912	0	$5d^8 6s 6p$ (⁴ P) ⁵ D	61352.25	3	$5d^8 6s 6p$ (² G) ³ F
46622.489	3	$5d^8 6s 6p$ (² F) ³ D	61633.79	5	$5d^8 6s 6p$ (² G) ³ G
46792.965	5	$5d^8 6s 6p$ (⁴ F) ³ G	61645.33	2	$5d^8 6s 6p$ (² G) ³ F
46963.670	4	$5d^8 6s 6p$ (⁴ P) ⁵ D	61942.22	4	$5d^8 (^3F_4) 6s 7p$ (³ P ₀)
47740.565	1	$5d^9 6p$ ¹ P	62062.29	2	$5d^7 6s^2 6p$ ⁴ F ⁵ G
48351.94	4	$5d^8 6s 6p$ (⁴ F) ³ F	62106.38	3	$5d^8 6s 6p$ (⁴ P) ³ D
48535.596	2	$5d^8 6s 6p$ (⁴ F) ⁵ G	62321.92	3	$5d^8 6s 6p$ (² D) ³ F
48779.337	3	$5d^8 6s 6p$ (⁴ F) ³ D	62510.36	4	$5d^8 (^3F_4) 6s 7p$ (³ P ₁)
49286.116	3	$5d^8 6s 6p$ (⁴ P) ⁵ P	62659.30	2	$5d^8 6s 6p$ (⁴ P) ³ D
49544.565	1	$5d^9 6p$ ³ D	62835.58	5	$5d^8 (^3F_4) 6s 7p$ (³ P ₁)
49880.883	2	$5d^9 6p$ ³ D	63067.47	1	$5d^8 6s 6p$ (² D) ³ D
50010.155	4	$5d^8 6s 6p$ (² F) ³ F	63167.33	3	$5d^8 (^3F_4) 6s 7p$ (³ P ₁)
50055.313	1	$5d^8 6s 6p$ (⁴ F) ⁵ F	63352.91	6	$5d^8 (^3F_4) 6s 7p$ (³ P ₂)
50299.385	5	$5d^7 6s^2 6p$ ⁴ F ³ G	63466.29	1	$5d^8 6s 6p$ (² P) ³ P
50387.66	0	$5d^9 6p$ ³ P	63826.31	2	$5d^7 6s^2 6p$ ⁴ F ⁵ G
51097.529	3	$5d^8 6s 6p$ (⁴ P) ⁵ D	63945.05	5	$5d^8 (^3F_4) 6s 7p$ (³ P ₂)
51286.946	2	$5d^8 6s 6p$ (² F) ¹ D	64248.95	2	$5d^8 6s 6p$ (² D) ³ D
51545.544	3	$5d^8 6s 6p$ (⁴ F) ³ D	64319.385	4	$5d^8 (^3F_4) 6s 7p$ (³ P ₂)
51753.317	2	$5d^8 6s 6p$ (² F) ³ F	64515.68	2	$5d^7 6s^2 6p$ ⁴ F ⁵ G
52071.684	1	$5d^8 6s 6p$ (⁴ P) ⁵ D	64619.64	1	$5d^8 6s 6p$ (⁴ P) ³ D
52438.59	5	$5d^8 6s 6p$ (² F) ³ G	64675.92	3	$5d^7 6s^2 6p$ ⁴ P ⁵ D
52520.13	4	$5d^8 6s 6p$ (² F) ³ F	64904.25	3	$5d^8 (^3F_4) 6s 7p$ (³ P ₂)
52708.365	2	$5d^8 6s 6p$ (⁴ P) ⁵ D	65306.80	1	$5d^9 5f$
53019.303	1	$5d^8 6s 6p$ (² F) ³ D	65315.89	2	$5d^9 5f$
53665.25	1	$5d^8 6s 6p$ (² P) ³ D	65318.95	6	$5d^9 5f$
53953.379	2	$5d^8 6s 6p$ (² P) ³ P	65325.49	2	$5d^9 5f$
54011.150	3	$5d^8 6s 6p$ (⁴ P) ⁵ P	65331.20	3	$5d^9 5f$
54133.26	2	$5d^8 6s 6p$ (⁴ P) ⁵ S	65332.43	1	$5d^9 5f$
54178.47	4	$5d^8 6s 6p$ (⁴ P) ⁵ D	65333.25	4	$5d^9 5f$

Table 2. Odd energy levels of Pt I. The leading components of the eigenfunctions are derived from theoretical studies of the mixed group of configurations $5d^96p + 5d^86s6p + 5d^76s^26p + 5d^97p$. Where other configurations are indicated, the designations are empirical—Continued

Energy (cm ⁻¹)	<i>J</i>	Leading component	Energy (cm ⁻¹)	<i>J</i>	Leading component
65336.49	3	$5d^95f$	67303.64	3,4	$5d^86s7p$
65339.66	4	$5d^95f$	67413.65	5,4	$5d^86s7p$
65341.92	5	$5d^95f$	68266.90	5	$5d^86s7p$
65510.22	3		68343.55	3,4	$5d^86s7p$
65697.70	2,1		68606.62	2	
65850.11	1		68657.42	3	
65852.56	4		70087.93	7	$5d^8(^3F_4)6s5f$
66198.85	2		70088.64	5,6	$5d^8(^3F_4)6s5f$
66432.56	1		70095.52	6	$5d^8(^3F_4)6s5f$
66927.43	2	$5d^97p(^2D_{3/2}, ^2P_{1/2})$	70099.57	5	$5d^8(^3F_4)6s5f$
67121.58	3	$5d^97p(^2D_{3/2}, ^2P_{3/2})$			

2. References

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